

Radiographic Comparative Study between Two Types of Implant Supported Mandibular Overdenture

Hanadi A. Lamfon

Assistant Professor, Prosthetic Branch, Department of Oral and Maxillofacial Surgery & Rehabilitation, Faculty of Dentistry, Umm Alqura University, Makkah, KSA

Abstract This study was performed to compare between two types of implant supported overdentures, with and without attachments. **Methods:** Fourteen completely edentulous patients received two implants in the canine region and loaded 3 months thereafter. Patients have been grouped into two groups; group I consisted of seven patients with two ball attachments and group II seven patients with support only (dome shaped). All patients have been evaluated for bone density and bone height changes around the implants at 0,6 and 12 months after loading. **Results:** Comparing the two groups throughout the whole study period, there was no statistically significant difference between them regarding the effect of treatment. **Conclusion:** Within the limitation of this study, the ball attachment and the dome shaped abutment used with implant retained/or supported overdenture prostheses did not affect the response of the tissues surrounding the implant.

Keywords Complete denture, Overdenture, Implant supported overdenture, Implant retained overdenture, Ball attachment

1. Introduction

Wearing of complete denture for a long time generally results in alveolar bone loss [1-3]. Overdenture concept was introduced as an alternative to extraction of all teeth and fabrication of complete denture [4]. The procedure is accepted as a definitive method of treatment [5].

The construction of total implant supported prosthesis may be faced with economic and anatomic limitations. The use of minimal number of implants to improve support and or retention of the removable prosthesis is considered as another approach for treatment [6, 7].

Mandibular implant-retained /supported overdentures are proved treatment modality which provide comfort and function for edentulous patients, in particular, those who have persistent problems using a conventional mandibular prosthesis. The high success rate of this treatment option, allowed many authors to consider it as the quality of standard for the edentulous patient [8].

Stud attachments have gained popularity and extensive documentation as well. They are easy to construct, install and maintain [9].

The use of implants as support only or as support and retention may affect the supporting structures of the implant [10, 11].

The purpose of this work is to compare between the supporting structures of the implants under mandibular overdenture with and without attachment.

2. Materials and Methods

2.1. Patients Selection

Fourteen completely edentulous patients were selected to participate in this study. They were free from any systemic disease that may interfere with dental implant placement and/or osseointegration, free from skeletal jaw discrepancy or any dental pathology interfering with complete denture construction. The Patients' age ranged from 55-62 years.

2.2. Denture Construction

Complete dentures have been made to all cases according to the standard technique followed at the Faculty of Dentistry, Umm Alqura University. The lower denture was duplicated into transparent acrylic resin to help in implant placement.

2.3. Implant Placement

Two screw type tapered root form implants (Legacy, Spectra system, Implant Direct, U.S.A.) were surgically placed in the canine regions bilaterally.

2.4. Grouping

Patients were randomly divided into two groups. **Group I** consisted of 7 patients, their ages ranged from 55 to 61 years, their implants were exposed after three months and stud

* Corresponding author:

hlamfon@hotmail.com (Hanadi A. Lamfon)

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attachments were installed and dentures adjusted (Figure1). **Group II** consisted of 7 patients, their ages ranged from 57 to 62 years, their implants were exposed after three months and a dome shaped abutment placed and dentures adjusted (Figure1).

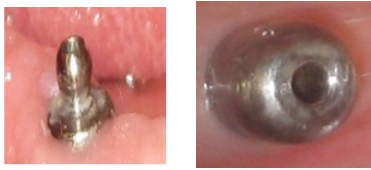


Figure 1. The left is stud attachment and the right is dome shaped abutment

2.5. Radiographic Evaluation

All patients have been radiographically evaluated at the time of loading (base line), 6months and 12 months thereafter. Standardized periapical radiographs were achieved through the use of digital periapical radiography (Digora system, Soredex-Finndent, Finland) with paralleling technique utilizing a specially designed radiographic guide for this purpose. The specially designed radiographic guide represents a simple modification of an L shaped bite block (XCP Instrument, Dentsply Rinn Corporation, USA). The modification was done by attaching the green snap-on mount transfer of the implant to the L shaped bite block by means of a self-curing acrylic resin in such way that the transfer is brought parallel to the film holding part of the bite block. The exposure protocol starts by the removal of the abutments from the implant using the torque wrench. Then the bite block with the image plate was snapped on the implant. The indicator arm and the aiming ring were then assembled to the bite block. The patient was asked to close on the bite block to avoid its movement during cone adjustment. Radiographs were recorded, all with the same radiographic machine and exposure parameters. The radiographs were compared with regard to the marginal bone height and density.

3. Results

3.1. Relative Bone Density

The mean values of relative bone density changes in both groups (I) and (II) showed no statistically significant difference during the follow up periods ($P < 0.05$).

Table 1. The Percentage Change in the Mean Values of Bone Density and its Standard Deviation During the Follow Up Periods

	Stud attachment		Dome shaped abutment	
	% change in mean values	SD	% change in mean values	SD
0 to 6 m	0.84	0.39	1.18	1.11
0 to 12 m	1.03	1.09	1.79	1.34
6 to 12m	0.19	0.99	0.62	0.64
P-value	0.076		0.081	

The relative bone density changes around the implants showed no statistically significant difference between the two groups during the follow up period ($P > 0.05$).

3.2. Bone Height Changes

The mean values of bone height changes percentage in both groups I and II showed statistically significant difference during the follow up periods ($P > 0.05$) table 2, while the bone height changes around the implants showed no statistically significant difference between the two groups during the follow up period ($P > 0.05$) table 3.

Table 2. The Percentage Change in the Mean Values of Bone Height Changes and its Standard Deviation During the Follow Up Period

	Stud attachment		Dome shaped abutment	
	% change in mean values	SD	% change in mean values	SD
0 to 6 m	-11.89	3.52	-15.39	6.62
0 to 12 m	-22.94	8.61	-30.87	25.96
6 to 12m	-10.31	6.82	-12.89	21.16
P-value	0.003		0.004	

Table 3. Mean Values of Bone Height and its Standard Deviation During the Follow Up Periods

	Stud attachment		Dome shaped abutment		
	Mean	SD	Mean	S D	P-value#
0 to 6 m	18.79	7.3	18.38	17.8	0.929
0 to 12 m	19.48	8.1	18.46	19.7	0.944
6 to 12 m	19.44	8.2	18.02	18.3	0.921

4. Discussion

Many investigators claimed lateral load to have more deleterious effect on dental implants than vertically applied load. The height of the stud attachments had been accused to increase the lateral load on the implant and surrounding tissue in laboratory studies [12]. Despite the difference in height of the attachment and the dome shaped abutment used in the two study groups, there was no statistically significant difference in bone changes (height and density) between both groups. This may be attributed to 1) The difference in height may be not enough to induce significant increase in the lateral load, 2) The both used; stud attachment and dome shaped abutment, permit a universal movement and stress breaking action by virtue of their design and resiliency thus allowing the ridge to bear most of the load. 3) The dome shaped abutment may induce lateral forces during the prosthesis movement thus transferring loads to the implants resembling the more load received by ball abutments due to their higher profile height so that both seems equivalent at the end.

5. Conclusions

Within the limitation of this study, the ball attachment and the dome shaped abutment used with implant retained/or supported overdenture prostheses did not affect the response of the tissues surrounding the implant.

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